Elastosis Perforans Serpiginosa in Association with Scabies Mite

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ABSTRACT

Elastosis perforans serpiginosa is a form of perforating dermatoses, which has a characteristic clinical presentation of grouped keratotic papules coalescing into serpiginous or annular configurations. The majority of elastosis perforans serpiginosa cases are idiopathic; however, various etiologies have been postulated for the pathogenesis of this syndrome. The authors present a unique case of elastosis perforans serpiginosa that developed focally secondary to a scabies mite. (*J Clin Aesthet Dermatol.* 2013;6(10):36–40.)

Elastosis perforans serpiginosa (EPS) is a form of perforating dermatoses, a group of cutaneous syndromes that are characterized by transepidermal elimination of connective tissue components. These syndromes are differentiated into four subtypes: reactive perforating collagenosis, perforating folliculitis, Kyrle's disease, and EPS. Elastosis perforans serpiginosa was first described by Lutz in 1953 as a distinct type of perforating dermatosis. Typically, EPS manifests as asymptomatic to pruritic grouped keratotic papules coalescing in a serpiginous or annular configurations.[1] Initially, because of its characteristic serpiginous morphology, EPS was termed keratosis follicularis serpiginosa.[2] Miescher[3] subsequently characterized this entity on the pathological finding of elastic fibers in the transepidermal elimination channels and termed it elastoma intrapapillare perforans verruciform.[3] The current name, elastosis perforans serpiginosa, was coined by Dammert and Putkonen in 1958.[4]

CASE REPORT

A 22-year-old previously healthy man presented with a six-week history of pruritic erythematous papular keratotic eruption localized to the right lateral nape of the neck (Figure 1). The papules ranged in size from approximately 2 to 6mm in size and coalesced in an arcuate serpiginous array (Figure 2). Prior to presenting to the authors' clinic, the patient had previously been diagnosed with folliculitis and had tried topical treatment with clindamycin for one month with no improvement. The patient denied any past medical history and denied use of any medications. Family history was negative for Down syndrome, connective tissue diseases, or any other systemic disorders.

The cutaneous lesions were suspicious for a perforating dermatoses, and two biopsies were obtained from the anterior and posterior neck. The findings demonstrated irregular verruciform epidermal hyperplasia with a hyperkeratotic and parakeratotic scale with intracorneal neutrophils. The granular layer showed focal hyperplasia and irregularity. No viral cytopathic changes were noted. However, in one sample, a scabies mite was present within the stratum corneum (Figure 3). The papillary dermis exhibited extensive areas of fibroplasia and focal collections of neutrophilic debris. There was also evidence of perforation with a focus of perforation with degenerating elastic fibers (Figure 4). The scabies mite was unusual, and hematoxylin and eosin (H&E) stains were obtained, which confirmed the mite. Additional stains for elastic fibers were performed using an elastic tissue

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stain (Verhoeff-Van Gieson, VVG), which demonstrated a focal transepidermal elimination of elastic fibers (Figure 5). These findings confirmed the diagnosis of a perforating disorder, and the diagnosis of EPS was made based on the cumulative histopathologic findings.

Elastosis perforans serpiginosa has been associated with various systemic diseases as well as medications. However, the authors believe this case may demonstrate a form of EPS in reaction to scabies mite. Following the histological finding of a scabies mite in one of the biopsy sites and further questioning of the patient, he did admit to generalized pruritis that he had experienced over the past eight weeks prior to the development of the cutaneous lesions.

The patient was treated with permethrin cream and ivermectin for his scabies. The cutaneous lesions of EPS were treated with electrocautery and dessication. The patient's two-week follow-up demonstrated overall clinical and symptomatic improvement; however, the EPS lesions did persist.

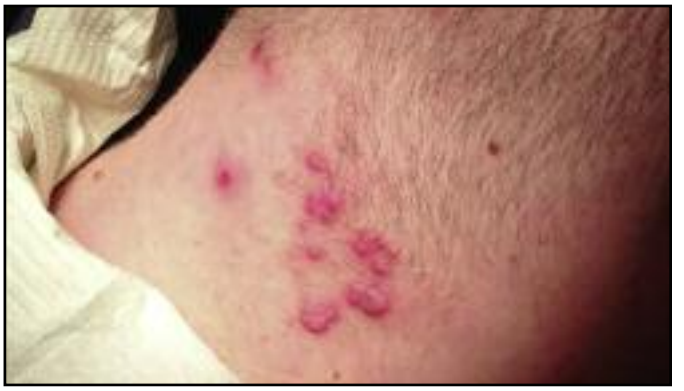

Figure 1. Multiple erythematous verrucous hyperkeratotic papules on the right lateral nape of the neck

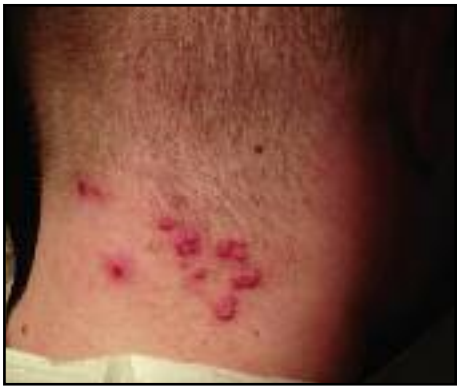

Figure 2. Erythematous popular keratotic papules coalescing in an arcuate serpiginous distribution

DISCUSSION

Elastosis perforans serpiginosa is a rare condition and has been reported more commonly in male than female patients with a ratio of approximately 4:1. Typically, EPS manifests during the second decade, with the majority of reported cases occurring prior to the age of 30.[5] EPS has been categorized into three subtypes: idiopathic, systemic disorder-associated, and drug-induced. The majority of EPS cases are idiopathic, whereas approximately 40 percent of EPS cases are associated with a systemic disorder and are rarely penicillamine-induced. The systemic disorders reportedly associated with EPS include trisomy 21, Ehlers-Danlos syndrome, osteogenesis imperfecta, scleroderma, cutis laxa, Rothmund-Thomson syndrome, acrogeria, pseudoxanthoma elasticum, and Moya Moya disease.[6,7] Trisomy 21 patients demonstrate joint hyperlaxity, acrocyanosis, and premature cutaneous aging, leading to connective tissue abnormalities and subsequent predisposition to EPS. Additionally, a subset of reported cases describe EPS with acquired disorders, such as diabetes mellitus, morphea, and renal failure.[8] Although rare, the development of EPS secondary to penicillamine is well documented in the literature and appears to be dose-related. This acquired form of EPS was first documented in 1972 following treatment of long-term penicillamine.[9] Long-term administration of penicillamine causes EPS in up to 33 percent of patients on high-dose therapy for Wilson's disease and cystinuria.[10,11] Penicillamine has also been reported to induce EPS when administered at low dosages for rheumatoid arthritis, primary biliary cirrhosis, and scleroderma. However, penicillamine-induced EPS accounts for only one percent of total EPS cases.[12] Additionally, a genetic predisposition to EPS has also been suggested by a few reports of familial occurrences.[13,14]

Clinically, the various forms of EPS present similarly as clusters of umbilicated papules with a central keratotic plug arranged in arcuate and serpiginous configurations most commonly localized to a region on the neck or upper extremities.[8] EPS has also been reported to occur on the face, axillae, abdomen, lower extremities, and glans penis, in symmetric and asymmetric distributions.[15,16] Asymmetric distributions occur more frequently in patients with penicillamine-induced or Down syndrome-associated EPS. Central atrophy in the arcuate lesion arrangement suggests coincident lesion regression and formation. An exceptionally rare generalized form of EPS with only a few reported cases have all been associated with trisomy 21.[17,18] EPS runs a variable course of duration with the chance of spontaneous resolution within months to years, but the potential for new lesions exists. EPS associated with Down syndrome tends to run a longer course of 10 years on average.[19]

Histopathologically, EPS demonstrates distinctive findings to confirm its diagnosis. The pathology typically consists of elongated tortuous channels in the epidermis with elastic fiber-filled channels spanning from the papillary dermis to a plug of epidermal hypertrophy and parakeratosis. Basophilic nuclear debris and eosinophilic elastic fibers are found within this channel.[20] The elastic fibers are extruded from the dermis, and there is degeneration and alteration of the elastic tissue in adjacent

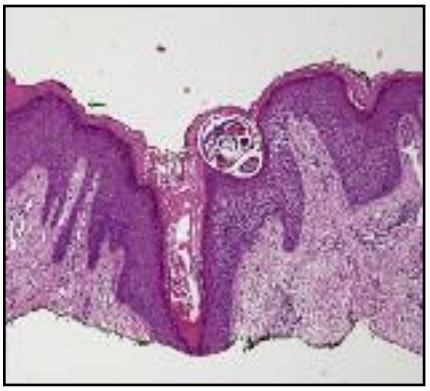

Figure 3. Higher power exhibiting scabies mite identified in the stratum corneum adjacent to focus of elastosis perforans serpiginosa

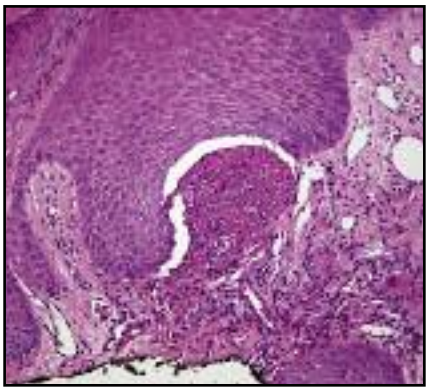

Figure 4. Focus of perforation with degenerating elastic fibers

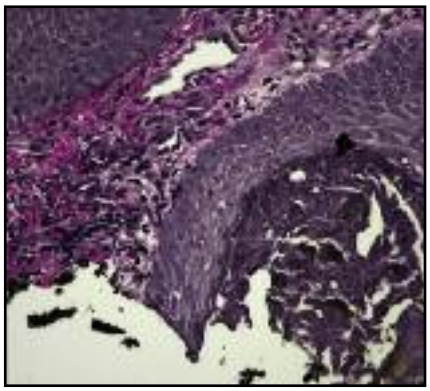

Figure 5. Verhoeff Van Gieson elastic stain illustrating degenerating elastic fibers and transepidermal elimination

papillary dermis with a reactive inflammatory response. The epidermis surrounding the lesion is acanthotic and hyperkeratotic.[21] Specific stains for elastic fibers may be utilized, including VVG or orcein stains, which will typically demonstrate the abnormal morphology of the elastic fibers. Additionally, the use of Sedi-Stain with skin scrapings may be used to confirm diagnostic suspicion before taking a potentially deforming biopsy.[22]

Several theories have been postulated in the pathogenesis of EPS; however, despite various hypotheses, the cause of EPS remains largely unknown. One theory suggests alterations in elastic fibers or localized inflammation in the dermis may initiate transepidermal elimination.[23,24] Fujimoto et al demonstrated *in vitro* that elastic fibers communicate with keratinocytes, influencing keratinocyte movement and terminal differentiation. The authors hypothesized that aggregates of altered elastin may chemo-attract keratinocytes, and upon binding to the upregulated keratinocyte elastin receptors, induce terminal differentiation of the keratinocyte, resulting in the formation of a transepidermal elimination channel.[25] Alterations in elastic fibers may occur primarily from a genetic cause or secondarily from a predisposition to external insult. The case presented herein may demonstrate this external insult to be a result of the scabies mite.

Another theory suggests an altered immune system in the pathophysiology of EPS. Schepis and Romano[26] hypothesized that immunological dysfunction may account for the increased incidence of dermatoses with Down syndrome.[26] The immunological dysfunction involved in the pathology of EPS is unclear, but may be related to abnormal phagocyte activity.[27] EPS is rare in patients with Trisomy 21, reportedly occurring in approximately only one percent of patients with Down syndrome.[28]

Elastosis perforans serpiginosa has also been thought to be resultant of an injured epidermal barrier.[29] EPS lesions commonly occur on anatomic regions prone to habitual scratching, such as the unilateral neck or antecubital fossae. A compromised epidermal barrier or a dermal response to chronic trauma may contribute to the development of EPS. Lee et al[29] reported two cases of EPS in patients with localized pruritic dermatitis treated with topical salt water. Both cases demonstrated EPS lesions developing in the ensuing days to the excoriated cutaneous sites that received salt-water therapy. Consequently, Lee et al[29] induced EPS in guinea pigs through the application of a calcium chloride salt-water solution and observed lesions localized only to the excoriated regions of the skin. Furthermore, the cutaneous application of inorganic salts and chemicals has been shown to cause acquired perforating dermatoses.[30] In a case report of a middle-aged Japanese woman with idiopathic EPS localized to the knees, Abe et al[31] considered the role of repetitive mechanical stress on the cutaneous knees from cross-legged sitting in the pathogenesis of EPS. Theile-Oche et al[32] also implicated scratch-induced cutaneous trauma in the molecular mechanism of EPS and other acquired perforating disorders. A compromised epidermal barrier may be involved in the pathogenesis of EPS and perhaps may be required to incite idiopathic EPS lacking inherent or penicillamine-induced elastic fiber abnormality. This theory of EPS resulting in areas of injured epidermal barrier and regions of habitual scratching may best describe the pathogenesis of our presented case, which resulted secondary to scabies mite in the same location.

Lastly, penicillamine-induced EPS demonstrates a unique hypothesized pathogenesis from the other subtypes. Long-term penicillamine administration has been associated with several cutaneous changes related to damaged elastic tissue including EPS, pseudo-pseudoxanthoma elasticum and acquired cutis laxa. Penicillamine causes not only cutaneous elastic fiber damage to lesional and nonlesional skin, but also elastic fiber damage to lung, gastrointestinal, blood vessel, and joint tissues.[33–35] Penicillamine inhibits lysyl oxidase, an enzyme involved in elastic fiber cross-linking, which leads to accumulated elastic fiber damage. Penicillamine

inhibition of lysyl oxidase may be direct, due to copper chelation, or indirect, due to binding with elastin that prevents elastic fiber cross-linking. Transepidermal elimination may then be stimulated by a collection of damaged elastic fibers.[36] Despite various proposed etiologies and pathogenesis of EPS, most theories describe a cutaneous response to altered elastic fibers.

Multiple treatments with various successes have been reported in the management of EPS; however, no gold standard therapy exists. An array of destructive modalities have been attempted with limited success, including cyrotherapy, curettage, electrocautery, dermabrasion, excision, tape-stripping, and topical salicylic acid ointment.[37,38] These destructive treatments have associated risks including scarring, keloid formation, atrophy, and hypo and hyperpigmentation. Furthermore, EPS lesions typically heal spontaneously with atrophic or stellate scarring, confounding the interpretation of treatment efficacy, such as in the case of spontaneous resolution of localized EPS after biopsy in a patient with Down syndrome.[39] Previous case reports demonstrate mixed results with the use of carbon dioxide, erbium-doped yttrium aluminium (Er-YAG), narrowband ultraviolet B (UVB), and pulsed dye laser, as well as with topical and intralesional corticosteroid therapies.[40–42] Phenytoin and narrowband UVB were ineffective in one case.[6] There have been single reports of success with topical imiquimod therapy, topical calcipotriene ointment, and systemic isotretinoin.[6,10,43] The reported success with topical imiquimod therapy supports the potential role of immune system alteration in the pathogenesis of EPS; however, further investigation is necessary.[44] Additionally, a previously reported case described effective treatment with topical tazarotene 0.1% gel once a day after two months of treatment in two patients; however, the lesions recurred upon discontinuation of the medication.[35] Penicillamine-induced EPS improves upon discontinuation of the medication, as new lesion development is arrested and existing lesions may persist or show subtle improvement upon cessation of the drug.[45,46]

CONCLUSION

Elastosis perforans serpiginosa is a form of perforating dermatoses that demonstrates a unique clinical presentation of asymptomatic to pruritic grouped keratotic papules coalescing in a serpiginous or annular configurations. Although various systemic disorders and medications, most notably penicillamine, have been associated with EPS, the majority of cases are idiopathic with various postulated theories of pathogenesis of this perforating dermatoses. A compromised epidermal barrier may be a major component in the pathogenesis of EPS, resulting in areas of injured epidermal barriers and locations of habitual scratching and trauma. The case presented herein uniquely demonstrates a form of EPS, which was possibly secondary to a scabies mite. The findings of a scabies mite found focally at the region of the cutaneous eruption may be coincidental; alternatively, the mite may have triggered EPS in a genetically predisposed host. Therefore, despite successful treatment of the patient's scabies, the cutaneous findings of EPS persisted.

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